SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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GEOLOGICAL RAMBLES THROUGH THE MINING DISTRICTS OF SOUTH DEVON.—No. III.

The Ashburton United Mines lie two miles to the south of the Atlas Mines, in the parish of Ashburton, on the right bank of the River Lemon, which separates that parish from Ilsington. The Owlacombe Mines, which is their local name, are undoubtedly the most ancient on the eastern side of the moor, having been probably worked in the sixteenth century. They are situated about three-quarters of a mile from the Dartmoor granite, and the channel of killas in the western part of the mines is unequalled in these districts. There are two principal workings entirely distinct from each other, except that the same adit branches through each—the Beam Mine and the Union Mine. The former mine is in the western part of the sett, is the most ancient, and has decidedly been the most productive. It was opened on two parallel lodes running near together—the North and South Beam lodes, the latter being the richest. The original engine-shaft of this mine was Parry's shaft, 53 fathoms west of the present engine-shaft (Hobson's). These Beam lodes were evidently very productive of tin near the surface, for the whole of the backs are worked away open-cast for a length of 200 fms., leaving a very remarkable excavation, which is still visible, and now, being overgrown with trees, resembles a natural gorge.

The Union Mine, a comparatively recent working on a lode of that name, considerably to the south of the Beam lodes, is in the eastern part of the sett; it has never been so productive as the Beam Mine. The Union lode underlies south, while the two Beam lodes underlie north.

Besides these two mines, there is a third working known as the Brothers Copper Mine. It is in the central part of the sett, and is supposed to be on the Union lode. It is an entirely distinct working, excepting the adit, and a cross-cut which is driven to it from Hobson's engine-shaft, 14 fms. below adit. Hobson's engine-shaft is in the central part of the sett, at the extreme eastern end of the Beam Mine. It is a perpendicular shaft, 55 fms. deep below adit, and 70 fms. below the surface. It is a recent work, having been sunk in the last working, about twenty years ago, the object seemingly being to have a central engine-shaft between the Beam and Union Mines. A 56-in. engine has been erected on this shaft by Mr. J. H. Gray, of St. Austell; it has 9½ feet stroke (equal beam), and works a 12-in. plunger column fixed at the 45, and a 10½-in. drawing-lift below that point. A stroke and a half a minute is enough to keep the water in work at this season, so that there is ample pumping power to give the mine a most effective trial.

The Union Mine has also a perpendicular engine-shaft 47 fms. below adit, and 59 fms. from the surface. The shaft is sunk to the south of the lode, which it intersects at 3 fms. below the 37 fm. level. It was sunk to the 47 perpendicular, intending to cross-cut south and try the lode at that depth, but the mine stopped before the cross-cut was driven. This lode was poor in the 37 cross-cut, and at the intersection 3 fms. deeper, and the ground in the bottom is not of a promising character. It was recently proposed to fork this mine by a line of flat-rods from the engine at Hobson's shaft, and drive the cross-cut in the 47, which would not be a very costly trial, as the lift is already down; but, upon more matured consideration, it does not seem that the prospects in this part of the sett warrant the necessary outlay.

The Brothers Mine seems to have been a trial for copper on the western part of the Union lode. Exaggerated—indeed, entirely unwarrantable—statements have been made as to the former copper produce of this mine. There is no evidence or tradition of copper ore ever having been sold from it; there are no floors or remains of copper dressing at the surface; and the trial seems originally to have been a failure. The adit, or 14 fm. level cross-cut from the engine-shaft, having recently been cleared out in this mine, the prospects in the ends and backs were not such as to justify further expense; consequently the project entertained of forking this mine by flat-rods from Hobson's shafts has been very judiciously abandoned. Some ore was raised from a pitch here last year, which at the time was considered rich, but it has turned out to be scarcely worth selling.

The Beam Mine has been the really productive portion of these mines, and Parry's shaft, the old engine-shaft of this mine, is still the deepest in the sett. The present bottoms are poor, but upwards the Beam lodes, particularly the South Beam lode, have been very productive of tin. Westward, the rich part of these lodes extended just into West Beam Mine, where the stratum changes its character, and the lodes become unproductive. Eastward, the North Beam lode has made ore nearly up to Hobson's engine-shaft, but the South Beam lode becomes unproductive within 30 fathoms of that shaft. At and east of Hobson's shaft both the Beam lodes are poor and unpromising. There are no workings at present on the Beam Mine. The only actual workings now going on at these mines are at Hobson's engine-shaft, on a lode called the south underlayer, of which little is known. The lode is at surface, considerably north of the Beam lodes, but as, like the Union lode, it underlies south, while the two Beam lodes underlie north. it intersects them, forming a junction with the North Beam lode at about 30 fathoms below adit, and with the South Beam lode at a deeper point, which, however, has not yet been reached. This south underlayer lode was discovered in the last working by tributers, who drove a cross-cut north from the engine-shaft in the 45 fm. level, and cut a good lode. In consequence of this discovery, another cross-cut was driven in the 35, but the lode was poor, and the tin ground does not appear to extend upwards much above the 45 fm. level. The engine-shaft, as before stated, is perpendicular to the present bottom (55 fms. below adit); at this point it intersects the South Beam lode, having already intersected the North Beam lode, both of which, particularly the former, are poor. From the bottom (the 55) a cross-cut north cuts the south underlayer, which is here very productive; indeed, all the tin now being raised, and half the tin already raised, is from the ground between this level and the 45 already mentioned. The engine-shaft is now being sunk another lift, from the bottom of which a cross-cut 4 or 5 fathoms north will again intersect the south underlayer. Two ends are now being extended on this lode—one the 45 driving west, and another in the 55 driving east, both in a fair course; the 45 east is tinny, but scarcely worth driving, while the 55 west is poor. The two former levels—the 45 west and 55 east—and the sinking of the engine-shaft is the whole of the tutwork now being prosecuted. The sinking of the engine-shaft progresses favourably, it being now 9 feet below the 55. Excepting the pumping-engine, the machinery on the mine is of a moderate character. There are two stamping-wheels, and a whim for drawing is now nearly completed; they are all worked by the same stream, which is ample in the winter, but fails greatly in the summer. At present each stamping-wheel only works three or four heads of stamps, and those slowly.

Most of the readers of the *Mining Journal* are aware that these mines were brought before the public by Mr. Nicholas Ennor, in the autumn of 1857. For many years various attempts had been made by different parties to get them to work, but Mr. Ennor alone was capable of gaining for them sufficient public confidence. Mr. Ennor's connection with the mines has now ceased for nearly a year, and his withdrawal has been followed by a serious depreciation in the shares, which, with 8*l.* 10*s.* paid, have been selling as low as 30*s.*, and are now, I understand, to be had for about 2*l.* The sales of tin and arsenic, which commenced early in the year, have realised 2548*l.* 14*s.* 5*d.* They are as follows:—

January	4	.....	10 tons	9 cwts.	1 qr.	20 lbs.	.....	£692	4 10
February	19	.....	7 „	1 „	1 „	26 „	.....	516	10 11
May	12	.....	10 „	16 „	3 „	23 „	.....	851	15 8
July	12	.....	5 „	18 „	2 „	0 „	.....	450	3 0
Arsenic		.....	20 „	0 „	0 „	0 „	.....	38	0 0

This amount, with the 8500*l.* produced by calls, gives 11,000*l.*, which it will probably be found is nearly expended at next account; on the other hand, there are now 10 tons of tin in the stone on the mine, besides about 4 or 5 tons stamped out.

As considerable personal discussion has recently taken place respecting the working of this mine consequent upon a change of management, I have taken peculiar pains to ascertain the facts, which I have given without any colouring or adornment. The mines are clearly not rich at present, and although their past produce from the Beam Mine has been, no doubt, considerable, yet there is no proof of their having paid any profit within modern times, although very large sums have been expended upon them. I am aware that sanguine and interested parties can always find reasons for this, but still the fact remains. Upwards of 10,000*l.* has been already expended, but the *underground* opening of the mines still remains to be accomplished. No doubt a great deal had to be done, and a great deal has been done, in clearing up old levels and shafts; but in the matter of ore ground, probably more has been taken away than has been laid open. About half the tin already sold, and all that at the surface, and now raising, has come from the south underlayer lode about the 45 and 55; the other portion of that sold came from the old works and from the eastern adits on the Union lode. The tinstone produced from these latter adits was very foul and poor, and left little, if any, profit to the company. The tinstone produced from the 45 and 55 has, on the contrary, been very good; but the ground already laid open is now in great part taken away, and two levels driving cannot be expected to lay open any very great quantity of new ground. So that the workings are, and may for some time be expected to be, "from hand to mouth;" the tin ground is taken away nearly as soon as laid open.

It is not easy to ascertain the future prospects of these mines, for much difference of opinion exists. It seems to be considered unanimously that the Brothers Mine is a failure; but many deem the Union Mine worthy of another trial. As to the Beam Mine, there seems little doubt that it should be tried again; but these are entirely questions of money. To work these two latter mines together would require a very large outlay, which the present depreciated price of the shares would not show much chance of raising. The system of working pursued by the present management is to direct attention to one point—the opening up of the south underlayer lode in depth. At the present bottom this lode seems fairly promising; but against it has been urged that little is known of it, and that the present ore is merely produced in it by its junction with the Beam lodes; and that, consequently, in a few fathoms more depth, when this junction is passed, it may be expected to be equally poor as it was found to be from the 45 to the surface.

Owlacombe is remarkable for containing one of the few "tin-bounds" now remaining. This ancient right to the tin, which is quite distinct from any ownership of the soil or other metals or minerals, is kept up by turning a turf at the different boundaries once a year. The tin-bounds here belong to Lord Mount-Edgcumbe.

MINING PROSPECTS OF THE WEST OF IRELAND.—No. III.

The southern shore of Clew Bay is principally formed by the picturesque and lofty ridge of mountain known to every Irishman in the world as St. Patrick's Reek. The cone which more immediately bears this appellation attains an altitude of 1850 feet above the level of the sea. The western arm of the ridge shows evident traces of igneous action; one of the bosses of the mountain has its top of decided crater form; the sides, also, in one or two places have certainly been mouths whence lava has been ejected. Near these serpentine is to be found, containing steatite and asbestos; some of the serpentine is extremely fine in colour, and is known as precious serpentine, but the majority is not so good as that of the Lizard Rock, in Cornwall. No diallage is to be detected, but greenstone and hornblende occur in dykes. These are overlaid by the immense St. Patrick's Reek, which is red sandstone, highly indurated; the apex, and nearly one-third from the top, is an entirely bare rock, which having been exposed to the action of the atmosphere for thousands of years, has become disintegrated in some degree, as the vast quantities of rubble stones which have partially rolled down its sides testify. Thus we see the hardest rocks in nature yield to the subtle, silent hand of time.

On the southern edge of this range, which has an easterly direction, a manifest change in the constitution of the rocks takes place; here the mica slate is again found, but by no means so highly charged with that substance as on the northern part of the bay, at Currane. Epidote and oxide of iron are to be procured, and near the greenstone actynolite may be easily detected, having a fine asbestiform crystallisation. Further south the rocks become more arenaceous in character, and more abundantly traversed by quartzose rocks, with dykes or veins of quartz traversing it in every direction; contra dykes, bearing much resemblance to Cornish elvans, are afterwards met with. On the occurrence of these the arenaceous slates change to argillaceous; they are much distorted in their positions, and intersected by numerous veins of quartz, associated with small quantities of iron pyrites. As we go further south the rock gradually becomes more decided in its character, until it is found true argillaceous slate, or the Cornish miners' killas, traversed by elvanic dykes, quartzose and metallic veins. The depositing stratification is here much elevated, being thrown into very nearly a vertical position. The crystallisation is rhomboidal and cleavage perfect; the nature of the killas is kindly for either copper or lead deposits. The ores of these metals undoubtedly abound; if adequate attention and research were made they would be discovered; but so remote is this place that little time or trouble appear to have been devoted to it. The maxim of "It did for father, and it will do for me," that bane of the old Irish character, seems to still be in full force here. The hour of improvement is, however, I trust, close at hand; and I firmly hope mining, that handmaid of science, that mighty aid of civilisation, and parent of wealth and comfort, may be instrumental in Ireland, as it has been in Cornwall, and in every other place where practised, in not only developing the resources of the interior, but assisting in the cultivation of the surface, and conduce, as it must, to the happiness of the people.

The only metallic vein I had the good fortune or time to examine was one worked many years since as the Shiffery Mine. This is a mighty champion lode, running nearly east and west; it has been worked in the most primitive manner, by merely driving a few galleries into the side of the mountain (about 1000 feet high), and these, too, at about midway! Vast quantities of lead ores are said to have been procured even by this rude process; the waste heaps show by the abundance of copper and lead ores therein that none but the most primitive processes were used for separating them from the gangue. I firmly believe they did not know what copper ore was; and it is even now called by the country people "yellow sulphur." The remains of a smelting-house show that when worked they must have had considerable returns; and I feel quite persuaded that were this property to be worked by modern appliances, directed by modern science, no property in Ireland would excel it in produce. All that can be desired for mining abounds here; water-power to any extent, and fuel to be had for the fetching; the only drawbacks are bad roads and bad accommodation for the miners. These would have to be, and can be easily, remedied should a good mine be developed; of this I have no moral doubt if prosecuted: from the nature of the killas, from the constitution of the lode, and from the appearances of the metals contained therein, I feel persuaded this will eventually be found a deep, rich, and lasting copper mine; the lead being the surface mineral in its composition, as tin ores are in many of the Cornish lodes. I searched diligently for blende, but failed to detect the slightest trace. I did, however, see decided evidences of parallel lodes, which will assuredly, at some day or other be driven to and wrought, when I doubt not these will be found productive of black jack.

To illustrate the extreme neglect into which this part of the country has fallen, and to illustrate the maxim I have quoted above, I shall relate a circumstance or two that befel on our visit to this locality. I was accompanied by a distinguished geologist of Dublin, and by a gentleman who was desirous of obtaining a slate quarry. We employed one of the country cars at Westport, and were driven by a genuine specimen of the Irish Jehu, whose tongue and horse went at pretty much the same rate, no obstacle retarding the going ahead of either. On our way Jehu suddenly stopped at a house, bearing a sign that it was an hotel, where thirsty souls could be accommodated with ale, porter, and spirits. Our conductor assured us with a leer that it was a respectable licensed house, but he only wanted to light his pipe, and give the horse a breath—*query*. The extraordinary appearance of the exterior—there being no chimney, but merely a hole in the thatch for the exit of the smoke—induced a desire to see the interior of this primitive mountain hostlery, when, ye Gods! what a sight presented itself. The establishment consisted of two rooms on the ground floor, the outer of which constituted kitchen, tap-room, coffee-room, barn, piggery, and cow-shed at the same time, as in it we found six cows tied to regular posts at the bottom of the apartment, a calf tied by a bit of straw rope to an article purporting to be a dresser, a child (a fine specimen of humanity, too) asleep in the wreck of a cradle, an old crone of a woman poring over a turf fire, and a fine pig in full and free possession of the entire range of the premises. The only "articles of household furniture" were two broken chairs, a mysterious looking heterogeneous mass of wearing apparel, spinning-wheels, wool cards, cleeves or baskets half full of potatoes, and other substances we failed to examine, but we were informed this was *the bed!* The interior or best room contained two old forms, a chair, a rickety table, and a box bed, constructed according to the true Irish system of wooden upholstery. From this place the hostess produced a bottle of Guiness's stout, and some of Allsopp's best pale ale. Jehu, on drinking "health and long life to your honours," proudly asked—"Now, didn't I tell your honours you would find this a place of the right sort?" To us it certainly was, and I hope ere long it will be even to the remote Irish, an unique specimen of accommodation. Be it remembered the incongruous inhabitants of that hotel were all assembled on a hot July afternoon, and this, too, in a Christian country, and in the nineteenth century. If mining prospers here such things as these will soon be superseded or expunged. May the advent thereof speedily display itself.

The news of our visit brought about another curious scene. On our return to the hotel at Westport, after the second day's exploration, the landlord told us that a man had been in town all day, awaiting our return, who was evidently in a state of considerable excitement and anxiety. On being introduced he took from his pocket and displayed a specimen, saying confidentially, "Now, for a valuable consideration, I will show you a vein of that (a stone of micaceous slate) on Lord Sligo's estate." The poor fellow thought and had buoyed himself up that it was silver ore; we had considerable difficulty in persuading him to the contrary. He retired evidently disappointed, but soon returned with a piece of crystallised quartz, desiring to know if it were not a real diamond? On being undeceived he departed, full of anger at our decision, which he evidently doubted. He was a farmer of good standing, and had walked 20 miles in the hope of gaining a handsome sum for his communication.

At the distance of four miles from Westport a slate quarry was worked for some years, but is now abandoned. The veins of workable stone are numerous, and nearly perpendicular. The metal (as the slate is called) is of good sound quality, but does not split into laminæ of sufficient thinness for exportation, nor does it stand quite so well as the Bangor, Westmoreland, or Cornish and Devon slates. The quarries, however, have never had a fair trial; the works have only been prosecuted at the surface. The quality is reported to improve in depth. No adit or level has been brought up to drain the quarries; only the rudest pumping machinery was in use. The majority of slate quarries in England and Wales are worked in mountain masses, where great depths are easily obtainable at little expense. It would be injustice to condemn these as not containing slates which could be utilised, but the extreme distance from the sea, and bad roads, at present seem insuperable obstacles to successful operations on a large scale; whilst the local demand is too limited to warrant re-opening them. The place is, however, well worthy a visit by the tourist and student, as many useful lessons may be gleaned, and the phenomena of slate veins traversing slate formations advantageously studied. The cleavage of slates may also be beautifully illustrated by specimens procurable here.

In the Clew Bay are numerous islands resting on mountain limestone, the shores of which are covered with rounded boulders of that substance. These are much prized by the neighbouring population, who burn vast quantities for building and agricultural purposes. Being already reduced to useful sizes for handling and carriage, they are far less costly than where limestone has to be quarried, so that the poor farmers have a capital opportunity of fertilising their lands if they choose at a very easy cost. These boulders contain a profusion of organic remains, amongst which encrinites take a prominent position. The auger fish has here been in great activity; nearly all the boulders are perforated by this wonderful animal, good spe-

cimens of which may at any time be obtained. As may be supposed, no evidences of metallic wealth are found on these islets, notwithstanding which the cliffs and shores will well repay a visit, as they afford an extensive field for examination. George Henwood.

Glances at Recent Geological Literature.

COSMOGONY: OR, THE RECORDS OF THE CREATION.*—Second Notice.

In our first notice (May 7), we observed that the object of the author of "Cosmogony" was to draw attention to the phenomenon of the "precession of the equinoxes," and to show that if we apply properly the well-known change observed on the surface of the earth which produces the "precession," we should have no difficulty whatever in accounting for all the organic remains of different climes found in England and other parts of Europe, and reconcile the same with the records of Holy Writ. "Cosmogony" appears to be founded on the principles laid down in Hopkins's *Geology and Magnetism*—the constant movement of the *surface* of the earth from south to north.

In *Geology and Magnetism*, it is maintained and demonstrated by the aid of the established change of 50·18″ per annum, called "precession," that the oldest part on earth (which, according to the principle of polar action, must be always situated within the Arctic region), cannot be older than about 25,000 years, even had it commenced its career as a dry land in the Antarctic region, and, consequently, that geologists are not warranted in assigning such extravagant age to the fossils entombed in our rocks. "Cosmogony" reduces the period to the Mosaic chronology by starting from the Equator instead of from the Antarctic region. The author very naturally assumes that man, and the entire animal kingdom, were placed in the tropical zone at the creation.

"Hence 5000 years ago England was within the tropics: the reptile tribe of the Wealden might, therefore, have lived 5000 years ago." * * "If, then, it was ordained at the creation that the laws of terrestrial physics should act in such a manner as to perpetually change the surface of our globe, and thus continually replenish the earth, to make it suitable for the wants of all generations, we should first consider whether these changes will account for the observed geological phenomena, rather than to presume to give so different a meaning to the simple and explicit declaration of the inspired writer." "We have astronomical observations extending to 2000 years back, which show that our habitation has been, and still is, continually moving from the south-east towards the north-west."—thus bringing in the course of ages southern lands to the northern hemisphere, the contents of which lands geologists have discovered, and have founded incorrect theories thereon, in contradiction to the Mosaic record."

M. Poinset, and eminent mathematician, has recently shown that the established theory of the "precession of the equinoxes" is at variance with the observed facts, and that it is necessary to modify it. Some writers, in opposition to this view, endeavour to prove that during 3000 years no change of climate could have taken place in Europe, because the children of Israel found the date and the vine flourishing in Canaan, and they exist there still. The author of "Cosmogony" replies to this argument in the following words:—

"It is true, dates and grapes still exist in Canaan, but not such clusters as were found in the brook of Eshcol at the time of Moses, when it was in latitude 14°." * * "The date plant is principally found within the tropics, and not in the north temperate zone. Let us calculate where the land of Canaan was 3000 years ago, which is now in latitude 32°; it was then in latitude 15° 30′ in the region of the most luxuriant date-palms and grapes." * * "At the time of Samson and David, Canaan was infested with lions and their young. Not so now." * * "We have, therefore, abundant proofs of changes of climate."

Granting the truth of this, there are other difficulties in the way of reconciling the past with the present. It is said naturalists have proved that the organic remains are quite different to the living system; however, this argument is now questioned.

"Attempts are constantly made to separate the fossil Flora from those now flourishing in tropical and south temperate regions; but scientific travellers, who are unbiassed by any theory, and prefer taking Nature as their guide, cannot distinguish the difference between the majority of the fossil Flora and the living specimens." * * "Six of the so-called new species of pine are wound-up into *one*, in a recent memoir on the Coniferæ." "Hence the necessity of exercising great caution before accepting new species, or believing that the organic remains entombed in our rocks are different from the living system, and that, therefore, they must have belonged to former worlds." * * "There is no foundation whatever for such a doctrine."

Prof. Banbury justly observes that every botanist who has examined large unarranged collections of dried plants from foreign countries must be aware how difficult it is in general to make out the affinities of specimens without fruit or flowers, and how often very similar leaves belong to plants of widely different families. "Yet mere fragments of leaves and stems are the only materials with which the describers of fossil remains construct their new genera and species, to give support to a favourite theory."

The same argument holds good when we come to the Fauna. Theory would not allow anything but marine remains to be found below the carboniferous series. *Stagonolepis* of the old red sandstone was placed by Prof. Agassiz amongst the fishes. The late eminent investigator of the old red sandstone fossils was also fully satisfied of the piscine character of the remains as to leave no doubt on the subject.

Prof. Huxley has recently re-examined the remains of *stagonolepis*, and has discovered that the so-called fish is a crocodile!

"Any one acquainted," says Prof. Huxley, "with the characters of the skeleton in the crocodilian reptiles can hardly fail to have his attention arrested by the remarkably similar features of the scutes of *stagonolepis*; and close investigation shows that there is not a single peculiarity of the latter which may not at once be paralleled by those of crocodilian scutes." * * To sum up in a few words the results of this long enquiry, it is evident that *stagonolepis* is altogether a crocodilian reptile."

Such will, doubtless, be found the case with many others.

Since our last notice geologists have been apparently startled by the discoveries of human implements below the tropical organic remains. Flint implements, knives, and axe-heads, have been found near Amiens, at the bottom of a stratum of gravel, and from 19 to 25 ft. below the surface. They have been actually found *in situ*—some by English geologists—where there is no appearance of the gravel ever having been previously disturbed, and, what is more remarkable, in a spot which forms the top of a hill. The implements are in great numbers; the natural conclusion is that they testify to *the existence of man on the earth at a period anterior to that commonly assumed by geologists in the order of the rocks*, and confirming similar conclusions drawn from the discoveries made in the Brixham Cave and elsewhere. Dr. Falconer has discovered knives of flint and agate in great numbers, with bones of extinct animals, near Palermo. The importance of these discoveries may be judged from the fact that man must have existed at the period when hippopotami swarmed in England, and other places in Europe. Geologists find now these facts so conclusive and irresistible that their cherished theories must be abandoned. These discoveries, however, are not really new; similar deposits were found many years ago, but being in opposition to the accepted geological theory—that man could not have co-existed with the fossilised races, &c.—the evidence could not be entertained. In "Cosmogony" we find the following:—

"Human remains have been found in caves both in France and Germany, mingled with the bones of extinct animals, thus plainly showing that they were coeval." * * "It must be borne in mind that human remains are not, and cannot be, liable to be deposited in the mud and sands of the ocean and lagoons, like shells, excepting in very rare instances; indeed, we seldom find, even in recent marine deposits, traces of the existing terrestrial animals. Why, then, should we expect to see them in ancient deposits? We need not, therefore, be surprised at not finding the relics of man as common as shells in the ancient marine and fresh-water deposits. However, even such a rare exception as a human fossil has been found in a limestone rock in the Island of Guadaloupe, in the West Indies. On the north-east coast of that island is a sloping bank of calcareous rock, which is submerged at high tide. This rock is composed of shells and corals, amongst which are found *human skeletons*." * * "I saw the place in 1833; the rock appears to be as old as the older tertiary of England, if not as old as the chalk. The human bones in general are found dispersed like the shells; a large slab of rock, in which a considerable portion of the skeleton of a female was embedded, was sent to, and is now preserved in, the British Museum." * * "In connection with the occurrence of human bones in limestone, it would be well also to refer to the impressions of *human feet* in sandstone, in a quarry at St. Louis, on the western bank of the Mississippi."

These are startling discoveries, which cannot be passed over in these days of enquiry.

"Having, then, these important facts before us, and the perpetual change, called the 'precession,' proved to a fraction of a second, by which we can determine in what parallel England, or any other place, was situated thousands of years ago, I think we ought to revise our theories carefully and impartially." * * "If we do this, and be guided solely by observations, and not by theories, we shall find that both geological and astronomical phenomena will be found to accord, and be in perfect harmony with the Sacred Record."

We recommend "Cosmogony" to the attention of our readers. The subject on which it treats is not only of great geological interest, but also of vast importance to the human race, inasmuch as the facts brought forward confirm our established creed, and thus render it unnecessary to devise incompatible and contradictory theories to account for the variety of organic remains entombed in the rocks below.

* "Cosmogony; or, the Records of the Creation." By F. G. S. T. Jepps, Paternoster-row. Price 2s. 6d.

THE SOUTH YORKSHIRE COAL TRADE.

The advantage which it is anticipated will accrue to the South Yorkshire Coal Trade from the new arrangement made by the Great Northern Railway Company, with respect to the carriage of coal to London, has induced the formation of a company, with a capital of 50,000*l.*, in 1*l.* shares, under the title of the Attercliffe Colliery Company. Of the Yorkshire coal sent into the London Market, the Silkstone invariably realises the best price; the present quotation for Chambers's Silkstone being 21*s.*, although Barnsley are readily obtainable at from 16*s.* to 17*s.* 6*d.* The property to be worked has been examined by Mr. T. D. Jeffcock, of Sheffield, and by Mr. T. Harrison, of Barnsley, both mining engineers well acquainted with the Yorkshire district, and they concur in the opinion that the cost of raising the Silkstone coal will not exceed 4*s.* 6*d.* per ton, including everything; whilst the cost of carriage to London, and the incidental expenses attending its sale, will not be more than 11*s.* 6*d.* per ton; thus leaving a fair margin for profit. The Attercliffe Colliery, situate about a mile from Sheffield, is already in work, and a fair plant is on the ground. There are on the property several beds of coal, the chief of which lie at the respective depths of 60, 180, and 280 yards. The upper bed is called the Swallow Wood; the second, the Park Gate; and the lowest, the Silkstone.

Mr. Harrison reports that the Park Gate seam is of excellent quality, and when sufficiently opened out would be capable of raising 450,000 tons per annum, which would yield a nett profit of 4000*l.*; and that the Silkstone would yield from 50,000 to 100,000 tons per annum, and yield a profit of from 10,000*l.* to 20,000*l.* He estimates the cost of sinking the necessary pits, erecting drawing and pumping-engines, with other requisite machinery for putting the whole of the colliery for the Park Gate and Silkstone seams into profitable working condition, will not exceed 25,000*l.* The very advantageous position of the colliery, and the quality of the coal, will always command a ready sale; and he considers the working of the colliery will be a highly profitable undertaking. The coal area from which the Silkstone and Park Gate beds are to be "won" comprises about 500 acres, and the leases for the colliery, plant, and coal area, will be for an unexpired term of 21 years, at a small rental, and subject to a royalty of about 10d. per ton. The transfer of all the privileges possessed by the present holders to the company for the sum of 7500*l.* The company, in order to facilitate the subscription for shares, have adopted a novel mode of receiving the amount payable on allotment; 2*s.* 6*d.* is to be paid on application for the shares, and 7*s.* 6*d.* will be required on allotment, which may, however, if desired, be paid by instalments of 2*s.* 6*d.*, with 5 per cent. interest, at intervals of not more than two months, and the remaining 10*s.* will be payable by two instalments of 5*s.* each, at the expiration of not less than eight and twelve calendar months from the date of allotment.

Perhaps, however, the most important document appended to the prospectus is the letter from Mr. Samuel Plimsoll, so well known from his intimate connection with the coal trade, who, after pointing out the many advantages possessed by the colliery, from its position and the character of the coal produced, draws up a balance-sheet, which shows that an annual profit of 18,550*l.* would be realised, and adds that the Silkstone seam alone will give nearly 38 per cent. upon the whole capital required.

THE COAL MINES OF BELGIUM.

A letter kindly furnished by M. Flamache, chief engineer of the Arrondisement of Charleroi, procured me admission to the Gouffre Colliery, which is situated near the busy little town of Chatlineau. This shaft is quite new, and is deemed one of the most complete in the coal field, all the most recent improvements in mining machinery having been introduced by the enterprising company by whom it was sunk. Instead of the dark wooden sheds, which form the common shelter for mining machinery, the visitor finds here a large and symmetrical brick building, with wings extending on each side, and having the appearance of a neat and extensive manufactory. The drawing machinery occupies one end, the ventilators a portion of the centre, and the machinery immediately connected with the shaft is placed above the mouth under the remaining wing.

The mine is worked in two levels, one 1085 ft. below surface, the other 1254 ft. The drawing is done by a 100 horse-power engine, and by a flat wire rope; eight cars are taken out at a time upon a cage similar to that previously described, but carrying two cars on each of its four stories: 200 cars are taken out per day of 12 hours. There are 500 working people connected with the mine, of which 100 are miners proper, and 30 women. The following is the average amount earned by the labourers in their different capacities:—Miners, 80 cents per day of 12 hours; women, 36 cents per day; common workmen, 40 cents; and boys, 30 cents.

The ventilation of the mine is excellent, and is accomplished by what is called "the Fabric System," after the name of the inventor, an engineer of Charleroi. The main shaft is made the down-cast, and after a proper circulation among the workings below the air enters the up-cast, which follows the side of the main shaft, and opens into a room adjoining the central building. The up-cast is here made to open into a box without a top; within this box are placed two fans, with three wooden wings, 10 ft. long and 6 ft. broad. These fans, when revolving in opposite directions, lock their wings into each other like the teeth of two cog-wheels. When now an engine of 25 horse-power whirls them rapidly arround, they draw a stream of air through all the passages with which the up-cast is connected.

The most interesting and novel contrivance about the establishment is a machine (one of five or six in use in the kingdom) which takes the labourers to or from the bottom of the pit or intermediate level. This machine has been in use for about four years, and is regarded with universal favour by the masters and the men. It occupies the northerly part of the large oval shaft, and consists of two steam cylinders ten feet long, and exerting an aggregate power of seventy-five horses, placed immediately over the pit, and working with their piston rods downwards. Attached to these piston rods, and extending 1254 ft. to the bottom of the mine, is a series of wrought-iron bars, bearing, like great ladders, at every twenty feet a platform large enough to allow four men to stand comfortably upon it. These platforms are so placed that when the piston rod moving one set is as high as it will go, and the other is as low as it will go, those of the two different series are opposite to each other, and a man steps readily from one to the other. If now, when the machine is in this position we step upon the upper platform, and steam is turned on, we quickly go down ten feet, whilst the opposite series of platforms raises ten feet, and brings a stage opposite to us which when we started was twenty feet below; we step upon this stage and are lowered again ten feet, and find a third platform ready to carry us down. Thus, continually stepping backward and forward we are carried, ten feet at a time, to the bottom of the shaft.

We had already our miners' clothes on, and our safety-lamps in our hands, when we stepped upon the upper platform; two moves were sufficient to shut out the daylight. Each piston makes about four strokes per minute, which required that we should make eight removes from one side to the other, and we were thus taken down eighty feet. The motion is easy, and there is but little noise; a pause of six or eight seconds is permitted between each stroke that the remove may be safely made, and should anyone be so thoughtless as to allow his toes to extend over the edge of the platform he is protected from injury by the outer board being hung upon hinges, which allow it to raise as soon as any pressure comes upon the under side. The machine is kept from vibrating by heavy wooden rails fastened to the side of the mine, and upon which it slides.

The portion of the shaft which contains this apparatus is not separated by a partition from that in which the coal is drawn, so that frequently in our passage we saw the dim cage shoot by with the speed of a railway car. We were scarcely half way down when sounds of whistling and singing began to come up from below. They came nearer and nearer, and at length we saw a dim light come crawling up the dark sides of the pit. In a minute more two sturdy miners were drawn up *vis a vis*, my guide had scarcely time to hold his lamp to their faces and hurry them to change places, when another stroke of the engine carried them up and us down to the next stage, where there were two more sooty mortals making their way towards daylight. The guide commenced reprimanding them with rapidly uttered French oaths for not getting out of the way quicker, but the full effect of his words were lost by our being carried three metres downward, and into another company. We went on, passing sometimes one, sometimes two persons, and occasionally finding a step empty, till we came to the first or upper level, when we caught a glimpse of men and horses preparing coal for being drawn up. The platforms became muddier as we went lower on account of the water that dripped from the sides of the shaft, and I found that my heavy miners' jacket was a necessary protection.

At length we stepped upon the bottom of the shaft, having been just 16 minutes on the way down. Here was a large brick arch, 40 feet long and 30 broad, which was occupied by the platforms used in loading the cage, and by the stables for the horses. Following one of the gangways that radiate from this assembling place, 10 minutes' walk brought us to where coal was being mined upon a principle entirely different from that which I described a few days ago. The seam is almost perpendicular, and consequently a system of gangways, with incline planes upon the footwall, cannot be adopted; and since the coal adheres closely to the sides, and is itself of quite firm texture, gravity will not take the place of manual labour, as is the case in a similarly situated seam in the Sharp Mountain at Tamaqua, Pennsylvania.

The mining is performed in the following manner, which, it will be observed, has the threefold advantage of entirely robbing the seam, of allowing a number of men to work at a time, and in a comparatively convenient posture, and of permitting all the detritus, such as the "small" and the slate, to remain in the excavated seam. A gangway is first driven 23 feet into the vein by means of platforms; the coal is then taken out till this 23 ft. is 12 ft. high. The workman then proceeds to timber the gangway heavily, and puts in a strong roof, through which, in the middle, a single hole is left. This hole is fitted with a trap, which can be opened at pleasure, and it serves to pass the coal from above into the cars below. The workman now drives directly upward, taking out a column 23 ft. in length. He builds a chimney above the hole in the gangway roof of the large pieces of slate, and keeps it always full of coal, which is drawn out as he mines more into the cars below. All the fine coal and slate falls into the open space around the chimney, and furnishes a floor, upon which the workman stands; and when the quantity of waste is not sufficient to fill up as fast as the coal above is taken out, new platforms are built of wood, and thus the floor upon which the miner stands is always kept within easy working distance of the face of the coal. When this first section of 23 feet is in working order, the gangway is driven 23 ft. further. A new platform and chimney is built, and a second miner takes possession of this column, driving it upward in the manner just described. When this is sufficiently advanced, a third column is started, and so the seam is opened to any extent desired.

When, however, the seam loses its perpendicular direction, and assumes an inclination of 20° or over, this system of excavation is abandoned, and the "long wall" system is adopted. In about an hour we ascended to the surface, our ascent, by the "man-machine," requiring just 16 minutes.

Turning around after leaving the last platform to view the working of the engines, we observed that it was the hour for the labourers to leave their work. Each stroke of the piston brought two men to the daylight upon entering which they put out their lamps and walked off to their homes. There was here a column of human beings, extending more than a 1000 ft. into the depths of the earth, being drawn, step by step, towards the surface, with so little exertion to themselves that we could hear them enlivening their journey with conversation and jokes, and scraps of merry songs. What a striking instance of the application of steam to economise human force! How different would be the feelings and appearance of these men were they compelled each day to toil up and down 1200 feet of the old fashioned slippery ladders.

On our way home we visited one of the largest pumping-engines in the coal field. It has just been erected by a firm in Charleroi, and is really a massive piece of work. The cylinder is 13 ft. long and 9 ft. in diameter; it is placed directly over the shaft, and works the pump at the bottom by means of a vast wooden rod. A separate engine pumps water into the boiler, and a third of eight-horse power will be used for repairing the pumps.

Scarcely a gun shot from this modern fabric we found a most striking contrast in a large engine on the Newcomen principle, which appeared to be so old that the number of its years had been forgotten. It still creaked its lime-encrusted joints with a power of 60 horses, pumping water from a pit 1100 ft. deep. With every stroke about a gallon of water was squirted into the open head to pack the piston, and here, for the first time, I saw those great brass cocks used instead of steam-valves.

The engineman really seemed to have a pride in his old fossil, for he changed the speed and performed a number of curious motions with his levers, and ended by assuring us, that although it required a few more coals than the other engines, it was about as good as the newer patterns.

—*United States Railroad and Mining Register.* R. H. L.

THE STEAM SHIPPING INTEREST.

The metropolitan press seems to be suddenly awakened to the importance of the steam marine, both for mercantile and war purposes. The lavish expenditure on our postal subsidies, to which the attention of a parliamentary committee has recently been directed, would seem even to point to an over degree of zeal on the part of our officials in the matter of accommodating the public with subsidised lines of steamers. The completion for sea of the *Great Eastern*, and the activity manifested in steam building in the public and private yards of our own and other countries, have led to close examination of the statistics of the steam marine afloat.

Steam shipbuilding, now that their construction is chiefly of iron, is necessarily closely identified with the mining interests. The more steamships we build, therefore, for our own use or for sale to foreigners, the greater activity is given to the mineral productive resources, the engineering operations, and the skilled industry of the country. One-half the aggregate tonnage that now enters our ports is propelled by steam; and since the repeal of the Navigation Laws there has been a threefold increase in the steam tonnage owned by Great Britain. No country can touch us in this respect, and we build and keep at sea the finest steamers in the world, whether for ocean or river navigation.

The steam-ship builders of the Thames, the Clyde, and the Mersey are kept actively employed with orders, whether it be for coasting steamers for Australia, ocean vessels for the Cunard, the Galway, or the Peninsular and Oriental Companies, for river service in our Indian empire, or on the Danube, or for gun-boats for China, or other distant quarters.

Twenty years ago there were but 770 steamers owned in the United Kingdom, now there are 1854 vessels, of a gross tonnage of 682,433 tons, exclusive of the large number now owned in the British colonies.

The steamer is now found on all the lakes and most of the rivers of both North and South America, Central and Southern Africa, in the interior of Australia, on the rivers of China and Asia as far as Amoor and Siberia, steam tugs, steam yachts, steam dredges, steam ferry-boats, steam frigates, steam gun-boats, steam colliers, steam canal-boats, and every variety of passenger boat—from the immense progress which steam navigation is making all over the world.

Since the establishment of ocean steam communication the commerce of Great Britain has exactly doubled in value, and there can be no doubt that the economy of time, and the speedy, regular, and cheap means of communicating with distant parts of the world, have mainly contributed to this increase.

When we look at the mighty advances made by man in the application of steam power to the arts, and especially in subduing the billows of the ocean to his sway, it requires no great faith to believe that the time is not far distant when every ship which navigates the ocean will use steam as a prime or auxiliary propelling power.

It is barely twenty years since the Atlantic was first bridged by regular steam communication between England and America, by the voyages of the *Sirius* and *Great Western*, and now there are no less than fourteen lines of steamers, with about fifty vessels, plying continuously across the Atlantic, and conveying nearly 60,000 passengers a year to North America. And this is only one of the many routes traversed by steam vessels leaving British ports.

In order to show the extent of the interests involved, even in this country, in steam navigation, it may be added that there are more than 2000 sea-going mercantile steamers owned in the British empire and her colonies, registering about 700,000 tons, besides about 400 steamers belonging to Her Majesty's Navy, and a large number of river steamers and tugs. The total entries and clearances of steamers at ports in the United Kingdom in 1857 numbered 14,188 vessels, registering 4,667,362 tons. But steam vessels are now largely employed by other countries as well as by Great Britain, both on the oceans and rivers, more especially by the Americans, French, and Austrians. We are, however, the principal steam shipbuilders for the world. The transport of mails, and the passenger and light goods traffic by steamers, are very considerable, and there are thousands of persons, therefore, interested in the movements of steam-vessels, particularly the friends of passengers, and those engaged on board; merchants, shippers, and others.

The great facilities offered by steam for receiving and executing orders has led to a largely extended demand in foreign countries and the colonies for all kinds of British manufactures. A glance at the Board of Trade

returns for last year shows that the shipments have gradually gone on increasing. Thus, the value of the coal exported has reached 3,000,000*l.*; hardware and cutlery, 3,500,000*l.*; machinery, the same amount; metals of various kinds, an enormous quantity—including iron, pig, bar, bolt, &c., to the value of 11,000,000*l.*; tin plates, 1,500,000*l.*; leather manufactures, including sadlery and harness, 2,000,000*l.*; ale and beer, nearly 2,000,000*l.*; apparel and slops, 2,000,000*l.*; haberdashery and millinery, 3,500,000*l.*; cotton manufactures, 32,000,000*l.*; linen and linen yarn, 6,000,000*l.*; earthenware and porcelain, 1,000,000*l.*; glass, 600,000*l.*; furniture, cabinet, and upholstery ware, 260,000*l.*; besides various other articles, bringing up the total exports to about 117,000,000*l.*

It does, therefore, seem somewhat strange, that whilst almost every other class interest has its special organ of publicity and advocacy, one of the largest and most important—one, too, that has contributed more than any other to England's present commercial greatness and prosperity—has not been specially represented by the press—has scarcely, indeed, hitherto been noticed at all in detail, and certainly has not had that prominent recognition and continuous special attention given to it which its extent, importance, and trade influence, fairly entitles it to.

It is, therefore, with satisfaction we see the announcement made of the intended publication forthwith of a weekly journal, to be entitled "The Steam Shipping Chronicle and Ocean Telegraph." The fact that Mr. P. L. SIMMONDS assumes the editorship and general management is a sufficient guarantee of the success of this new class journal. Mr. SIMMONDS is so well known in literary and scientific circles in the metropolis, has been so long identified with the leading maritime and commercial journals, and has so large a foreign correspondence, that he can bring to bear an immense amount of practical information, business detail, and maritime support to such a journal, which we can safely say could not be placed in better hands.

NEW PROCESSES OF MAKING IRON AND STEEL.—No. III.

MR. SPENCE'S PATENT.—We have now to refer to the introduction of the steel manufacture into this district as a product of our hematite iron—a subject, therefore, in which all our Cambrian readers must confess to feel special interest.

While Mr. Bessemer's proposals, however attractive in theory—and particularly in the doing away with the puddling furnaces—were conceived by practical and commercial men to be wholly a failure, various parties in this country had taken the manufacture of steel directly from the pig-iron, *in the puddling furnace*, by a method brought over from Germany in 1835. Being carried on, however, in the common iron puddling furnace hitherto in use, this process proved defective, there being no uniformity in the result. For this reason, although so long introduced, it made very slow progress, gained no favour, and indeed was known only to comparatively few.

Our neighbours, the Derwent Tin Plate Company, of Workington, commenced the manufacture of tin plates with this description of steel, in place of iron; but they found it necessary, from the defects alluded to, to devise some other means of producing steel that should be greatly more uniform in quality. It has been truly said that necessity is the mother of invention. Investigating the principles on which the manufacture is based, Mr. Spence, of that firm, discovered that the theory of the German method is entirely erroneous. It is based on the assumption that it is the degree of temperature, or, in other words, the quantity of caloric, that determines whether the product of the furnace shall be iron or steel. Under this idea the German system turns upon the arrangement of the damper by which the heat of the furnace is controlled. Now, as the heat at which cast-steel is held in fusion without injury to its quality is greatly beyond any attained in a puddling furnace, it is clear that excess of heat is not the difficulty to be overcome. Reasoning out these observations, Mr. Spence arrived at the conclusion that the active agent in the removal of the excess of carbon in the pig-iron—or in other words, in altering the constituents of the crude metal to those of steel—is not caloric, but *the oxygen of the air passing through the furnace.*

All pig-iron is impure steel, containing an excess of carbon, commonly about 3 per cent. To convert it into steel all that is required is to remove the impurities and reduce the carbon from 3 to about 1 per cent. To effect this result Mr. Spence has applied the principle he discovered by the following method:—His furnace is constructed with two fires, so placed that the flame and air from the one have to pass over the other in order to reach the metal. In the first stage of the process, when oxygen is essential to remove the excess of carbon, the inner fire is open to the access of air, which passes through it, and supplies sufficient oxygen for the purpose. The second stage of the process is clearly marked by the molten metal becoming solid. Steel being less fusible than cast-iron, the moment the change takes place from cast-iron to steel, the metal, owing to its lesser fusibility, begins to solidify, forming granular lumps, instantly apparent. On this, the doors of the inner fire are at once closed. The outer fire now maintains the required heat for welding the grains together; but before the draught from it can reach the metal it must pass through the incandescent fuel of the inner grate. Being thus deprived of its oxygen, it is rendered perfectly inert, and incapable of removing any more of the carbon, which it is essential no longer to reduce.

By this simple but effective arrangement steel can be produced of any degree of hardness or temper, as it only requires to leave the dors of the inner fire partly open to soften the steel. When entirely closed the product is steel, so thoroughly saturated with carbon that by simply melting it, cast-steel is produced fit for boring tools and instruments requiring the hardest temper.

As this method of dealing with so important a measure originated in this district, and adds considerably to the commercial value of our iron, we have heard with pleasure of its complete success. Although, as incidentally observed last week, but six months before the public, it has already been adopted by several extensive firms in South Wales; and on visiting the Derwent Tin-plate Company's establishment, on the South Quay, at Workington, the other day, we found that they had just started one of Condie's patent steam-hammers, and are extending their own manufacture of steel. We were greatly interested at witnessing so large a concern in full operation in our neighbourhood. The whole process was going on at the time. The manipulation of the fluest metal in the double furnaces—its solidification when converted into steel—its removal to the steam-hammer, by which it was beaten into further purity, consistency, and form—its being taken thence in shape something like large bricks, to powerful rollers, through which it was repeatedly passed, &c. Numerous workmen, men and boys—many of them stripped to the buff—were occupied in these processes. Few hereabouts wot that such a striking industial scene is to be beheld at Workington. The shipbuilders of West Cumberland might find it their interest to look into a place so nigh at hand, where steel plates and bars are so abundantly manufactured.

In the first of these articles we alluded to the superiority of all iron made with charcoal as fuel. This had hitherto been attributed to the freedom of such fuel from sulphur, well known to exist in all coal. But may it not be that when charcoal is used a minute proportion of carbon remains in the malleable iron, too small to impart the obvious properties of steel, yet sufficient to give that superiority of metal so well known. It appears, indeed, from Mr. Spence's observations, that for a century past—at least from Mr. Cort's time—we have been making steel in every puddling furnace without knowing it, and without knowing when to stop at it. From the amount of attention now directed to the subject, and the practical success of Mr. Spence's method, it appears probable that ere long steel will be produced at a price that will permit of its substitution for iron generally. If the result verify this anticipation, the advantage to the arts, looking at the greater strength and durability of steel, will be incalculable. We shall have stronger boilers, lighter locomotives, bridges of greater span, and vessels of so light a draught of water as to enable the blessings of commerce and civilisation to be carried up many a river inaccessible and unnavigated to this day. Dr. Livingston has already a steel steamer on the Zambezi, and a number are at this moment building for the Indus and the Ganges.

There is another point of view in which this movement seems to be of national as well as local interest. Hitherto, although the largest producers of common iron, yet we have had to import from Sweden all the iron used in Sheffield for steel purposes. To judge from the present promise of the manufacture, it is not improbable that ere long we shall be shipping our native steel, the produce of our West Cumberland and Furness hematite iron, to Sweden, instead of buying from her the material from which to make it. All the better for this district. We have ore, coal, and lime for the manufacture sufficient to meet any demand for long periods of years to come.—*Whitehaven Herald.*

HOT-BLAST OVENS FOR IRON FURNACES.—At the Institution of Mechanical Engineers, on July 27, an abstract was read of a paper "On the Construction of Hot-blast Ovens for Iron Furnaces," by Mr. Henry Marshous of Wolverhampton, the discussion of which was adjourned from the previous meeting (see Journal, May 14), giving an outline of the origination and early development of the idea of hot-blast, by Mr. Neilson, of Glasgow, in 1829; and noticing the successive modificatfons and improvements that have been effected in the construction of hot-blast ovens, and the greatly increased temperature of blast thereby obtained; pointing out particularly the great perseverance and ingenuity displayed in overcoming the serious difficulties arising from failures of the earlier apparatus, and from leakage produced by the effects of expansion. These difficulties had been successfully overcome in the improved form of oval oven, which has been in constant work for some time at the writer's works, near Wolverhampton, and has proved thoroughly satisfactory, the blast being maintained uniformly at a temperature of about 800° Fahrenheit, producing an important improvement in the working of the iron furnace. The pipes for heating the blast are placed upright around the sides of the oven, and the centre of the oven is filled up with a core of fire-brick, which acts as a regulator of the temperature of the blast, by absorbing any excess of heat from irregularity of firing, and giving it out again on any diminution of temperature.—Mr. Nelison gave an interesting account of the circumstances under which the idea of hot-blast first occurred to him, and his early experiments in the practical application of the plan to iron furnaces, relating the great difficulties that had to be encountered at first from the prevailing ignorance with respect to the operations of iron furnaces, and from the prejudice of furnace managers. He referred to the question of the comparative strength and value of hot and cold blast iron, and in the comparisons made between them he thought there was frequently a misconception as to the circumstances involved in the question, as it had been stated that hot-blast iron was necessarily inferior in strength to cold-blast, but if made from equally good materials the hot-blast iron was found to be as good as cold-blast, and some of the stronger castings had been obtained from judicious mixtures of hot-blast irons.—Other speakers expressed the same opinions, and commented upon a recent report by Government commissioners upon the marine engines of the navy, in which it was proposed to exclude the use of hot-blast iron in their construction; and considered such a proposal was not based upon sufficient investigation of the subject, and was directly opposed to the results of general experience in the use of hot-blast iron when made from good materials.

AUSTRALIAN POSTAL SERVICE.—The merchants have great cause to complain of the great delays which have taken place, owing to the irregular mode in which the Peninsular and Oriental Company have performed their contract. The *Times* very justly observes that the *Great Eastern* will now become the overland route to India. It may be remembered that our correspondent, Mr. John Clare, jun., of Liverpool, has often advocated the introduction of large ships to carry the mails and passengers to different parts of the globe: he states that 5,000,000*l.* per annum would be sufficient to keep a class of steam-ships which would be equal to any emergency, and, at the same time, transport troops to any distance. He calculates that New York might be brought within six days, Panama ten days, and Australia, China, Calcutta, and Bombay, thirty days of London. This we have no doubt could be accomplished; and the saving of freight, &c., would naturally be a great advantage. For many years, even when the doctrine was unfavourable, Mr. Clare has enunciated the principle of large ships; and now that the necessity and importance of this is acknowledged we trust his merits will be recognised, and some tangible acknowledgment awarded to him for his services in the cause.

TO THE ENGLISH AND WELSH MINERS.

FELLOW-MEN,—We beg to inform you that, through the perseverance and industry of your deputation, aided by Mr. M'Donald, the representative of the Scotch miners, there is a probability that a Royal Commission will in a few days be granted, to enquire into the social condition of the mining body.

The enquiries of the Commissioners will have special relation to the working of the Mines Inspection Act, which terminates in 1860; a fair system of weighing the miner's material; the truck laws of the North; the butty system in Staffordshire and Derbyshire; short time, more especially for the young employed in mines; also the means provided at the different collieries for educating the miners' children.

As the report of the Commissioners must necessarily depend on the kind of evidence they receive in the different districts through which they pass, it behoves all who are anxious to emancipate themselves from the black damps and explosive impurities of mines in general, and the oppressive exactions and arbitrary regulations that exist in particular districts or collieries, at once to be up and doing, for it mainly depends on ourselves what kind of evidence shall be laid before the Commissioners. If we, who endure the evils, remain in apathy, permit judgment to go by default, from neglecting to collect evidence, and directing the attention of the Commissioners to the proper points where evils abound, and where grievances are more or less aggravated or numerous, how can we expect the report of the Commissioners to be favourable, or the legislation based on the same to be beneficially effective to ourselves and children?

Then let us not sit in apathy, grumbling at home, but put our shoulders to the wheel, with fixed determination to raise ourselves from our present degraded position. We must hold public meetings in every town and village in the country, write to the public papers, and lay the ills our mining "flesh is heir to" bare and naked before the public vision; thus will the labours of our next deputation be mitigated, and probably a good legislative measure secured, on account of the irresistible weight of public opinion aiding us.

All local secretaries, or such as have any respect for our cause, should put themselves immediately in communication with the district secretaries, giving full and detailed information on the following subjects:—What is the name of your colliery, and to whom does it belong? Is the butty in vogue, and how do you propose to remedy the evil? How many men and boys are employed, and what hours do they work respectively, especially the boys? Do the employers provide any means for educating the miners' children—if so, what? Are women employed on the banks and pit heads? What is the standard of education in your locality? Do the employers permit the miners' material to be fairly weighed? Do you work by the piece or the day, and what do you receive per day or ton for getting the coal; and what have you to pay for stoppages per ton for tramming, sharpening, shafts, powder, fuse, oil, candles, &c.? What are the average wages, men and boys respectively, for the last three months? What is the output per day? What is the state of the ventilation, and how is the Mines Inspection Act carried out at your colliery? How often has the Inspector visited your colliery the last 12 months, and what occasioned such visit? Are the bye laws objectionable; point out such as are not satisfactory? Do the employers inflict fines, and to what extent? These and all other grievances should be immediately pointed out by every colliery in all districts, and sent in writing to the district secretaries (or to some central point), who should keep a register of the same for the use of such parties the district may think proper to select, to be examined before, or who may be called on by, the Commissioners for examination.

Fellow-men! we exhort you to unite in this good work. To the few it is impossible; to the many it will be easy. Union men or non-union men must unite in this good work, for there is now such an opportunity of improving our social position, and ameliorating our condition, by securing a good legislative measure next session, as will, perhaps, never occur again. Then, as the work is before us, let us keep our eyes steadily fixed on the common object. Let every step be a sure one, and one in advance, then we shall in due time arrive safely in the haven of a better future.

"England expects every man to do his duty."

By order of the Miners' Amalgamated Council,
R. MITCHELL, Sec. to the English Miners.

Longcar-street, Barnsley, Aug. 16.

COLLIERY INSPECTION—THE REPORTS.

No. 1. THE NORTHERN DISTRICT.—The simultaneous publication of Mr. Hunt's "Statistics of the Mineral Wealth of the United Kingdom" and of the "Annual Reports of the Government Inspectors of Coal Mines" renders both documents of more than usual interest. From Mr. Hunt's return, we learn that Mr. Dunn's district contains 163 collieries—135 in Durham and Northumberland, and 28 in Cumberland. In Durham and Northumberland alone no less than 15,853,484 tons of coal were raised, and from the collieries within his district in Durham some hundred thousand tons more; and, as the whole of the accidents referred to in his report were but 68, it appears that upwards of 100,000 tons were raised for each life lost. We may here remark that there was a clerical error in our statement on Aug. 6, the number of tons raised for each death in the respective years being transposed; the improvement was as stated, but 69,827 tons were raised for each death in 1858, and 58,284 in 1857. Of the 64 separate accidents upon which Mr. Dunn reports, it is highly gratifying to find that only two resulted in the death of more than one person—three persons losing their lives by the fall of a cradle at Washington Colliery on April 6, and three by an explosion at Croft Pit, Whitehaven, on Aug. 14; so that, although, as Mr. Dunn remarks, the casualties in his district have slightly exceeded those of the preceding twelve months, there is an absence of any general explosion or other general calamity. The accident at Washington Colliery occurred during the repairing of a shaft. A cradle was hung from a portion of the shaft frame, to which the gin pulleys were also attached; three men were upon it, and in the act of getting down walling stones, when, for want of sufficient diagonal bearances, the pulley frame gave way, and all three were killed. The safety of the scaffold had been questioned, but it was thought that all was right; the foreman himself was one of the sufferers.

At Dryburn, near Lowick, a death from carbonic acid gas took place, owing to the pit being in course of sinking without a brattice, and also improvidently small; the accident appears the more inexcusable as the state of the pit was known two or three days previously. An accident occurred at Monkwearmouth on May 30; one of the deputies was trying the tightness of a stopping, when the gas fired, and he lost his life. At Wellington Pit, Whitehaven, on July 1 an instance was afforded of the marvellous actions of men well aware of the danger to which they are exposed. The place in which the sufferer by this explosion was going to work was observed to be foul at the top, it being a seam nearly 10 ft. high; he first tried his safety-lamp, and, by a strange infatuation, he afterwards raised his candle, and a fire was the consequence, which resulted in his death.

The most important explosion during the year took place in the Croft Pit, Whitehaven bannock band seam. The explosion originated in a rise board standing without bratt'ce 18 yards up, the brattice and rails having been improvidently withdrawn a few weeks previously; Postlethwaite, the deputy, although an old and experienced man, removed the top from his lamp where gas existed, the death of himself and two others resulting.

There was an explosion at Seghill on Oct. 11, by which one man was so severely burnt that he died. When the collieries of Burradon and Seghill were in the hands of Messrs. Carr the ventilation was in common; the Seghill pit being the upcast, not only for its own extensive workings in the low main seam, but also those in the yard coal, together with a portion of air from Burradon, the furnace smoke, and the steam discharged from a large underground engine; the upcast shaft being only 8 ft. in diameter, the amount of ventilation in the yard coal was, therefore, limited to a few thousand feet per minute. Although a very small extent of workings were carrying on with naked lights, it came out during the inquest that upon a fall of the barometer a great discharge of gas was emitted from a "trouble" which ran through the workings, and upon more than one occasion narrow escapes had taken place. Having thereupon examined the pit, and as the ownership of the collieries are now distinct, they have been disunited in the ventilation by permanent stoppings, which has had the effect of placing both collieries in a most satisfactory state, each ventilating its own works independently.

Mr. Dunn's suggestions, as well as those agreed to by the Inspectors at their annual meeting, were fully detailed in the *Mining Journal* of Aug. 6.

No. 2. THE SOUTH DURHAM DISTRICT.—The Southern Division of Durham, which is inspected by Mr. Atkinson, contains 140 collieries, from which a large proportion of the coals recorded above as produced in Durham and Northumberland were raised. In Mr. Hunt's Statistics, the returns for the two counties are not given in such a manner as to admit of the produce of the mines inspected by Mr. Atkinson being separated from those inspected by Mr. Dunn; but in Durham and Northumberland together 15,853,484 tons were raised, and in Cumberland 920,137, so that in Mr. Dunn's and Mr. Atkinson's districts combined the produce of the collieries was 16,773,621 tons; and as Mr. Dunn reports 68 deaths, and Mr. Atkinson 91=159 deaths, it appears that there was but one life lost for each 105,496 tons raised. In Mr. Atkinson's district the number of accidents per annum is gradually increasing—the deaths being in 1853, 69; in 1854, 57; in 1855, 58; in 1856, 62; in 1857, 80; and in 1858, 91.

The accidents from explosions of fire-damp have slightly exceeded the average of the six years, yet only four lives were lost, and each of these from a separate accident; this is doubtless gratifying, when it is considered that many mines in the district generate and give off large quantities of fire-damp, requiring the daily employment of an immense number of safety-lamps, constant attention to the production of an energetic artificial ventilation, and the continuous exercise of great skill and care, accompanied by the most rigid discipline, in order to avoid those fearful disasters which sometimes arise from the explosion of large accumulations of the gas in mines. Of the accidents from explosions, the first took place at Cassop Colliery, where a man from curiosity visited a place in which he had no business with a naked light and fired the damp; he was so much burnt that he died nine or ten days afterwards. The second explosion occurred at Kelloe East Pit, on July 10; a man was killed by an explosion, although he had been two or three times warned that his candle indicated the presence of a dangerous amount of fire-damp. The explosion at Woodhouse Close Colliery, on Oct. 15, arose through a misunderstanding of the orders given by the overman.

The falls of coal and stone have been higher than in any year since 1853; these accidents, Mr. Atkinson remarks, are so entirely fortuitous that it is difficult to assign any satisfactory reason for the yearly variations in their number, beyond what may arise from the greater or less degree of care and precaution exercised to guard against them by the workmen, or the deputies and others having charge of them, although they are probably influenced in a slight degree by the comparative suddenness and extent of the alterations of temperature during the different seasons, and in shallow pits by the quantity of rain falling on the surface in a given time. Of the 31 deaths of this description, 17 of the persons who lost their lives were coal hewers, 6 stone workmen and wastemen, 4 deputy overmen, and 4 putters, horse drivers, &c. Mr. Atkinson remarks, it is extremely desirable that the coal hewers of his district should exercise a greater amount of care and caution towards protecting themselves from falls of roof and coal than they have commonly done heretofore; and he suggests to the owners and viewers of mines, where deputy overmen are employed, the adoption of a special rule, requiring every deputy to visit, examine, and securely timber the working place of each person under his care at intervals of not more than four hours. He repeats his suggestion, that all timber which cannot be withdrawn without risk to the men should be left to perish.

The deaths resulting from accidents in shafts have been slightly below the average of the six years. The 11 deaths were the result of 11 separate accidents, which is satisfactory. The only accident calling for remark is that at the Ryhope sinking, which arose from the rare practice of drawing water through a cradle on which workmen were employed; the deceased fell through the hole and was drowned.

The loss of life from miscellaneous accidents was greater than in either of the previous six years. The only accident resulting in the death of more than one person was that at the Page Bank Pit, where nine were suffocated and a tenth killed by falling down the shaft; but, in addition to this, the number of accidents causing the loss of single lives have been exceedingly numerous, and this increase in the deaths is probably in a much higher ratio than that of the quantity of coals raised in the same time, a result which appeals strongly to the managers and viewers of the district to spare neither pains nor expense in matters affecting the safety of the persons employed in the mines under their care.—[We shall continue the Reports in our next Journal.]

CLEVELAND RAILWAY—PROGRESS OF THE WORKS.—With reference to our notice on July 23, we have received a communication from Mr. Wm. Cockburn, in which he remarks that the assertion that in the operation of making the above-named railway the seam of ironstone cut upon Capt. Challoner's estate is from 12 to 14 ft. wide is an exaggeration, and that anyone acquainted with the district will not attempt to deny his statement. The adjoining mines of Messrs. Attwood and Co., at Belman Bank, sufficiently prove, he says, the assertion he makes; also the seam cropping out at Shape Wath Bridge, which is known to be a continuation of the vein, and is only 7 ft. in thickness. The struggle between Darlington and Hartlepool, with a view to securing the business created by the development of the Cleveland ironstone deposits, so far as it has gone, gives Darlington the nominal victory, and the inhabitants do not fail to appreciate their position. Darlington, it is said, has increased in importance, and year by year feels the influence which well-invested and properly-protected capital always tends to promote. Occupying the coal field and the valley of the Wear, extending its arms by Stockton, the Tees mouth, and the shore to the rich iron district of Cleveland, it is evident that the head quarters of the Darlington Railway Company—which this place is—whence indeed emanated, years and years ago, not only much of the capital required, but entirely the intelligence with which to direct it, must be materially affected by the success of any measure decidedly calculated to frustrate the interests of that company at any given point. Mr. Ralph Ward Jackson has been labouring hard during the past session, but although successful in the Commons the Lords' committee have decided against him. The committee was of opinion that the existing Guisborough branch is sufficient to accommodate the probable traffic in ironstone, including that which may be expected to come down upon it from the authorised Cleveland line, excepting the stone in the north side of Eston Nab. With respect to that part of the ironstone on the northern side of Eston Nab, which they feel is not so well accommodated by the existing line as it would be by a line running directly north towards the Redcar branch, they think that if the present owners, or the present lessees, or any future owners or lessees, either separately or conjointly, should make a railway from that part of the ironstone to the Redcar branch, that there should be a junction there with the Stockton and Darlington Company's line, and that the Stockton and Darlington Company should now bind themselves, in the event of such branch being made, to carry the traffic to the shipping place from the junction at a maximum charge per ton. What the charge should be the committee was not in a position to state, but they thought that if the Stockton and Darlington Company would consent to the conditions stated, the opposition bill ought not to be further proceeded with.

ROLLING STOCK OF THE GREAT WESTERN RAILWAY.—On June 30 the broad guage rolling stock consisted of 173 passenger and 129 goods engines, 2 royal saloons, 180 first-class carriages, 84 composite, 230 second-class, 98 third-class, 55 passenger, luggage, mail, and break vans, 196 carriage trucks, 184 horse boxes, 945 open goods wagons and cattle trucks, 1581 covered goods wagons, 1674 coal, coke, and permanent way trucks, 124 timber trucks, 21 goods break vans, and 18 furniture van trucks. The narrow guage rolling stock (northern division) consisted of 31 passenger engines, 70 goods engines, 36 first-class carriages, 16 composite, 43 second-class, 59 third-class, 27 passenger, luggage, mail, break, and other vans, 29 carriage trucks, 37 horse boxes, 259 open goods wagons and cattle trucks, 365 covered goods wagons, 2440 coal, coke, and permanent way trucks, 58 timber trucks, and 34 goods break vans.

RAILWAYS.—The number of miles of railway in the United Kingdom on Dec. 31 was 9506, of which 6976 are in England and Wales, 1342 in Scotland, and 1188 in Ireland. In addition there are 4543 miles authorised, but not opened, of which number 2773 will probably be abandoned.

THE SUEZ SHIP RAILWAY.—When Mr. Jobard proposed a monster railway, upon which the trains were to run at the rate of 300 miles per hour, his notion was considered as most ridiculous; and, doubtless, the proposition of Messrs. Brunlees and Webb, of Westminster, will meet with a similar reception. The object of their scheme is to obviate the necessity for constructing the Isthmus of Suez Canal, and, perhaps, in comparison with that project, the railway may be a step in advance, although we should be sorry to predict that the one will be more profitable as a commercial enterprise than the other. From reliable published information, Messrs. Brunlees and Webb find that the Isthmus is almost level, and, therefore, they say there will be no difficulty in laying down the compound railway. This compound railway is to consist of five pairs of rails, and at each end of the line will be piers, basins, lighthouses, hydraulic lifts, cradles, &c. Messrs. Brunlees and Webb consider that it is impossible to frame a correct estimate for so precarious an undertaking as M. de Lesseps's projected canal; and we admit the justice of their remarks to the fullest extent, and not only so, but we unhesitatingly add that those remarks would apply with equal force to the ship railway. Messrs. Brunlees and Webb "calculate that the earthworks, permanent way, locomotives, piers, basins, lighthouses, hydraulic lifts, cradles, with tools and machinery, allowing an ample margin for contingencies, will amount to the sum of 4,800,000*l.*" In our opinion, the greater part of this sum would be absorbed in the purchase of rails, chairs, and fastenings, conveying them to their destination, and simply laying them; so that we might (with reference to the estimate of 4,800,000*l.*) use Messrs. Brunlees and Webb's own words, and say it is "a sum which, if multiplied by five, might still cause great misgivings in the mind of a practical and disinterested engineer." Our opinion is that, as commercial enterprises, both the canal and the railway will prove most signal failures. The cost of the iron alone would not be less than 1,000,000*l.*, even assuming the comparatively light rails used on English railways; and to give an idea of the inaccuracy of the estimate, we may state that the cost of a similar structure in England, after the ground was ready for the laying of the rails, would not be covered for 1,500,000*l.*

LARGE STEEL CASTINGS.—M. Sudre has invented an improved mode of producing cast-steel, whereby sufficient quantities may be produced for extreme size castings. The essential features of the invention are the application of a raverberatory furnace, in which the compound necessary to produce steel is introduced; the use of a revereberatory furnace having the hearth heated by a suitable flue beneath, which admits of inferior fuel being used; the use of gas for the above purposes; the use of a highly heated vessel as an intermediate receptable for the steel from the cruciblies; and the use of scoria as a protective layer for the surface of the steel.

NOVEL USE OF BRAY'S TRACTION ENGINE.—The vestry of St. James's, Westminster, lately adopted the suggestion of levelling the new macadamised pavement in Regent-street, by means of a large iron roller, weighing 20 tons, and of the diameter of 9 ft.; but when in action there arose not only the objection on account of the space occupied by the large number of horses required to draw it, but no means could be devised for taking it safely down the incline of Waterloo-place, although by increasing the number of horses it might be drawn up the hill. In this dilemma application was made to the directors of Bray's Traction Engine Company, for the loan of one of their engines; this was readily granted, and on Tuesday and Wednesday morning of this week the large roller might be seen quietly following the engine, which had such perfect control over the load behind it, that for the purpose of showing this it stopped several times going down Waterloo-place; also, on ascending it stopped half way up, and started again with perfect ease, notwithstanding the dead pull of 20 tons behind it. Several men were in attendance with large blocks of wood to act as breaks in case of need, but their services were not required. The road surveyor appointed by the vestry to accompany the engine reported that, not only was the experiment most successful, but that the engine, so far from doing (as was apprehended) damage to the road, rather assisted in rolling it, on account of the width of its driving wheels.

[From the *Engineer.*]

Iron pipes, coated with coal oil, have lain for 20 years in moist earth without any commencement of rust.

The so-called gold wire of Lyons is formed by exposing a rod of copper at a red heat to the vapour of zinc, whereby it is externally converted into brass.

An alloy of 4 parts of Banca tin (the cohesive strength of which is from 3211 lbs. to 3650 lbs. per square inch), with 1 part of bismuth (strength 3008 lbs.), has been found to have a cohesive streath of 16,692 lbs. per square inch.

Railway embankments containing pyrites or bisulphide of iron have sometimes emitted flame and smoke from the disengagement of sulphuric acid. On one line in the Midlands all the sleepers upon an embankment were thereby charred so that they had to be replaced.

The Bombay wootz is a steel containing a portion of alumina. When highly carburetted steel is fused with alumina, a white, granular, brittle alloy is formed, containing 6·4 per cent. of alumina. On fusing 67 parts of this alloy with 500 of steel, a compound similar to wootz is obtained.

Marine glue was patented by Mr. Jeffery, in 1842. It is formed by dissolving 1 lb. of cnoutchouc, in small pieces, in 4 gallons of coal naphtha, with frequent stirring, the solution occupying ten or twelve days; 2 parts shellac are then fused in an iron vessel, and 1 part of the solution being well stirred in the glue is poured out on slabs to cool. A joint made with this glue between two pieces of wood becomes stronger than the fibres of the wood itself.

Kyan's process of saturating timber with corrosive sublimate was patented March 31, 1832. The same means of preserving timber had been practised, however, nearly 100 years before.

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